Supplemental-Fig. 1. Sustained and transient responses to maintained visual stimulation. Under conditions of EEG arousal, rabbit LGNd neurons with concentrically organized receptive fields are readily differentiated into Sustained and Transient classes based on their response to standing contrast over their receptive field center (Swadlow and Weyand, 1985; Bezdudnaya et al., 2006). Population post-stimulus time histogram are shown, generated by the 17 Sustained (A) and 17 Transient (Sub-sample B). (B) neurons following the presentation of a one second stimulus over their receptive field (dark or light spot, matched to the sign of the receptive field center), error bars show ± SEM. Note the very distinct response profiles of these two populations.

Supplemental-Fig. 2. Spatiotemporal characteristics of axonal and synaptic responses are highly stable over time. This Sustained LGNd neuron was studied for over four hours, and thousands of spontaneous action potentials were recorded each hour after first locating the neuron (13,390 spikes in hour 1, 18,354 in hour 2, 16,281 in hour 3, and 14,076 in hour 4). For each hour-long period, the current source density was calculated. While very subtle differences in these depth profiles can be detected with close inspection, little change can be seen in the spatiotemporal characteristics of either the axonal or post-synaptic currents.

Supplemental-Fig. 3. Illustration of sub-sampling relative to amplitude and retinotopic alignment. The mean amplitude of the monosynaptic response and the degree of retinotopic alignment for the Overall-sample (black circle), Sub-sample A (open circle), Sub-sample B (blue circle) and Sub-sample C (red circle). Bars indicate the minimum and maximum response amplitudes and degree of alignment. In both the Overall-sample, and in Sub-sample A, the response amplitude extends to zero, indicating that some members of this sample did not generate a synaptic impact at the cortical recording site.

Supplemental-Fig. 4. The post-synaptic response generated by an LGNd neuron in both layer 4 and layer 6. The lower dashed arrows indicate recording sites known to be located in layer 6 (indicated by long-latency antidromic spikes elicited by microstimulation via thalamic microelectrodes).

Supplemental-Fig. 5. The interval dependant reduction of the post-synaptic response generated by sustained vs. transient LGNd neurons is stable over time. For Sustained and Transient cells, the reduction percentage seen with short preceding interspike intervals (5-20ms) was very similar during the first and second halves of the dataset (x- and y-axes, respectively).

Supplemental-Fig. 6. LGNd spikes with short preceding intervals are not associated with substantial changes in cortical interspike intervals. (A) Cartoon showing how spontaneous spike trains from pairs of simultaneously recorded thalamic and cortical neurons were studied. For each thalamic cell, spikes were selected which had either short (A1, 5-20 ms) or long (A2, 500-3000 ms) preceding interspike intervals (selected spikes noted by black arrows). In both cases, the next cortical spike was located (red and blue arrows) and the preceding interspike intervals of these cortical spikes were measured (red and blue lines). (B) The blue and red bars to the left show the mean cortical interspike interval that was associated with the short (blue), or long (red) thalamic intervals. Cortical spikes associated with long thalamic interspike intervals had preceding intervals that were only a 16% longer than did cortical spikes associated with short thalamic interspike intervals (mean 580 ms and 502 ms respectively, error bars show ± SEM). Additionally, for layer 4 neurons (blue and red bars on the right) long thalamic intervals were associated with a 26% increase in cortical interspike intervals.